United States Department of Agriculture | Forest Service | Forest Pest Management NE CA Service Area | 55 So. Sacramento Street Susanville, CA 96130 916-257-2151 VOICE 916-257-6244 TTY

Lat 40.52885 Lon -121.56409
Lat 40.49692 Lon -121.42618

Reply to: 3420

Date: Novemeber 1, 1995

Subject: Jeffrey pine beetle-related mortality in Lassen National Park (Report NE95-15)

To: Lassen National Park Superintendent

On August 28, 1995 I drove north to south on Hwy. 89 through Lassen National Park. I noticed several pockets of Jeffrey pine beetle-related mortality throughout the north side of the Park. Areas of scattered mortality include Table Mountain and the Butte Lake area. Concentrated mortality is present in the Manzanita Lake and Campground area and near Lost Creek just north of the Summit Lake. I contacted Russ Lesko, Chief, Resources Management. At his request, we revisted Manzanita Lake Campground and the Lost Creek area on October 2, 1995.

Current Condition

Manzanita Lake and Campground

Jeffrey pine tree mortality in all size classes is occurring around Manzanita Lake, around the administrative sites and within Manzanita Lake Campground. The mortality is due primarily to the protracted, below normal precipitation period between 1987 and 1994 and the Jeffrey pine beetle, Dendroctonus jeffreyi. Jeffrey pine ranging from about 5" to >60" DBH are affected. Ips emarginatus and Dendroctonus valens (red turpentine beetle) were found associated with the Jeffrey pine beetle infested trees. Group kills range in size from 2-10 trees and in some cases there are large single trees that faded this year. Within the campground and on the west side of the lake there are several green infested Jeffrey pine trees. These trees were attacked this year and will fade next spring or early summer.

In most areas of the campground there is very little Jeffrey pine in the understory. White fir has seeded in and is competing with the pine for the available nutrients and soil moisture. The pine that is present is infested with western dwarf mistletoe, Arceuthobium campylopodum. Without some management of the white fir and the pine resources, the combined affects of drought, overstocking, Jeffrey pine beetle and dwarf mistletoe will eliminate the likelihood of maintaining Jeffrey pine as a component in the campground. As a result of the mortality this year, there are several trees around the administrative sites and throughout the camground that pose a hazard.

Lost Creek (crossing at Hwy. 89)

A large Jeffrey pine group kill is visible from the Hwy. on the east side of the road. Mortality appears to have started in this pocket in 1992 and increased in size over the past 3 years. The mortality is due primarily to the

protracted below normal precipitation period between 1987 and 1994 and the Jeffrey pine beetle, Dendroctonus jeffreyi. Jeffrey pine ranging from about 5" to 25" DBH are affected. Ips emarginatus and Dendroctonus valens (red turpentine beetle) were commonly associated with the Jeffrey pine beetle infested trees. Over 800 trees were attacked last year and faded this summer. Field observations indicate that mortality will continue in this area next year as several additional trees were attacked this year around the outer edge of the large group kill. The trees in this group kill do not meet the definition of hazardous trees (ie. in a campground or within distance of falling on a road). A monitoring study is being established to follow the mortality throughout the course of this outbreak to gain additional information on Jeffrey pine beetle biology and how this bark beetle operates in unmanaged stands.

Discussion

The priority issue identified was the Jeffrey pine mortality in the Manzanita Lake Campground and the Park's desire to maintain Jeffrey pine as a major component in the area. Of immediate concern was whether direct suppression of Jeffrey pine beetle was a realistic option to reduce the morality in subsequent years. Circumstantially successful Jeffrey pine beetle suppression projects have been conducted in the Lake Tahoe Basin Management Unit since the mid-1980's. Infested pine trees were removed on an annual basis for 4 consecutive years (1983-1987) on 165 acres. Mortality in the treated area declined from 330 trees in 1983 to 4 trees in 1987. Reduced mortality is also apparent in the Zephyr Cove Resort and Nevada Beach Campground as a result of annual suppression efforts initiated in 1993.

For a suppression project to be efficacious in terms of reducing mortality the infested trees need to removed or have the bark peeled prior to beetle emergence in May of 1996. Based on the observations in the Campground, newly infested trees are in the immediate vicinity of trees that faded this year indicating that suppression efforts would be a viable option to consider in an attempt to reduce further mortality associated with the group kills.

Based on the current level of infestation, the likelihood of these beetles emerging next year and attacking the remaining Jeffrey pine resource is quite high. In anticipation of conducting a suppression project, efforts are ongoing to map the infested trees within the campground to better document the level of infestation and determine the scope of the project. I am working with Russ on the procedures for requesting Forest Pest Management Suppression funds for project implementation in FY96. Subsequent long-term management alternatives, to include dwarf mistletoe suppression and thinning out some of the white fir, will lead to the desired future condition for this area.

If you have any questions regarding this report or any other entomological concerns in the Park, please contact me at 916-257-2151 ext. 6667.

Sheri Lee Smith
Entomologist
NE CA Shared Service Area

Jeffrey Pine Beetle, Dendroctonus jeffreyi

The Jeffrey pine beetle is the principle bark beetle found attacking Jeffrey pine, which is its only host. It is a native insect occurring from southwestern Oregon southward through California and western Nevada to northern Mexico. The beetle normally breeds in slow-growing, stressed trees. The beetles prefer trees which are large, mature, and occur singly rather than in groups. When an epidemic occurs, the beetle may attack and kill trees greater than 8 inches in diameter, regardless of age or vigor. Often the beetle infests lightning-struck or wind-thrown trees, but does not breed in slash.

Evidence of Attack

Presence of the beetle is usually detected when the foliage changes color. The color change of the foliage is related to the destruction of the cambium layer by the beetle. Generally, the top of the crown begins to fade in a slow sequence, with the needles turning from greenish yellow, to sorrel, and finally to reddish brown. By the time the tree is reddish brown, the beetles have usually abandoned the tree. Another sign of beetle attack is large, reddish pitch tubes projecting from the bark of the infested tree. If examined carefully, pitch tubes can be detected on infested green trees prior to crown fade. Jeffrey pine beetles have a distinctive "J" shape egg gallery pattern on the inner bark. Larval mines extend across the grain and end in open, oval-shaped pupal cells.

Life Stages and Development

The Jeffrey pine beetle is one of the larger pine bark beetles in California. The beetle has four life stages, egg, larva, pupa, and adult. The adults are stout, cylindrical, black, and approximately five-sixteenths of an inch long when mature. The egg is oval and pearly-white. The larva is white, legless, and has a yellow head. The pupa is also white but is slightly smaller than the mature larva. The life cycle is normally completed in one year in the northern part of the range, but in the southern part, two generations per year may occur. The principle period of attack is in June and July, but attacks also are frequent in late September and early October. Similar to other Dendroctonus species, Jeffrey pine beetles use pheromones that attract other beetles to a tree, causing a mass attack that tends to overcome the tree's natural resistance. Bluestain fungi are associated with Jeffrey pine beetle attacks and aid in overcoming the tree.

Conditions Affecting Outbreaks

Normally the Jeffrey pine beetle is kept in check by its natural enemies, climatic factors, and the resistance of its host. Similar to other Dendroctonus species, the availability of suitable host material is a key factor influencing outbreaks. Healthy trees ordinarily produce abundant amounts of resin, which pitches out attacking beetles. When deprived of moisture, trees cannot produce sufficient resin flow and they become susceptible to successful beetle attacks.

Dwarf Mistletoes

Dwarf mistletoes (Arceuthobium spp.) are parasitic, flowering plants that can only survive on living conifers in the family Pinaceae. Each species of dwarf mistletoe infects one or a few closely related species of trees. They obtain most of their nutrients and all of their water and minerals from their conifer hosts.

Dwarf mistletoes have a unique method of seed dispersal. Seeds are forcibly discharged in the fall when the fruit ripen and are shot out for many feet. The seed is covered with a sticky substance and adheres to whatever it contacts. When a seed lands in a host tree crown, it usually sticks to a needle or twig, where it remains throughout the winter. The following spring the seed germinates and penetrates the twig at the base of the needle. For the next 2-4 years, the parasite grows within the host tissues, developing a root-like system within the inner bark and outer sapwood, and causing the twig or branch to swell. Aerial shoots then develop and bear seed in another 2-4 years.

Dispersal of dwarf mistletoe seeds is limited to the distance the seeds travel after being discharged. From overstory to understory, this is usually 20 to 60 feet, but wind may carry them as far as 100 feet from the source. A rule of thumb is that the seeds can travel a horizontal distance equal to the height of the highest plant in an infected tree. There is some evidence that long distance spread of dwarf mistletoe is occassionally vectored by birds and animals.

Vertical spread within tree crowns of most dwarf mistletoes is limited to less than one foot per year because of foliage density. Because of the thin crowns of Digger pine, however, the vertical rate of spread has been measured as being greater than 2 feet per year. This rate of spread equalled or exceeded the rate of height growth of infected trees.

Dwarf mistletoes are easy to identify because they are generally exposed to view within a tree's crown. Signs of infection include the yellow-green to orange mistletoe plants, basal cups on a branch or stem where the plants were attached, and abscised plants on the ground beneath an infected tree. Symptoms include spindle-shaped branch swellings, witches' brooms in the lower crown, and bole swellings.